

DEER MORTALITY SURVEY

Morristown National Historical Park

April 4, 1984

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On April 4, 1984, Morristown National Historical Park conducted a Deer Mortality Survey and Carcass Study. This was the first such study and is expected to become part of the park's annual resource management monitoring program. This report has been prepared to provide valuable background information, document procedures and techniques, discuss purposes and objectives and share the results with other involved and related land-management agencies.

Introduction: The park white-tailed deer (*Odocoileus virginianus*) population is both an important and valuable natural resource and occasionally a controversial management issue. Limited information on the population exists. One valuable method for gathering information on the deer as well as the habitat condition is an annual deer mortality survey.

The ability of habitat to sustain a healthy deer population becomes most apparent during the critical winter season. During this period, food reserves may become severely limited as a result of heavy snow cover and plant dormancy. In addition, deer traditionally "yard-up" or group together in sheltered areas, quite often southeastern slopes during harsh periods to conserve their own energy reserves. Their movements may be limited during these times and as a result, available foods become even more limited. As a result of this behavior in combination with reductions and changes in habitat, starvation induced mortality may occur.

The annual deer mortality survey, conducted just after this critical period, will assist in the monitoring of habitat condition, deer population health and environmental factors. This first year study provides valuable baseline information for future comparison.

Background: During fiscal year 1983, the park resource management staff decided to implement this survey in accordance with the Deer Management Project Statement (N-11) in the park Natural Resource Management Plan. Initial plans were made with the assistance of New Jersey Division Fish, Game and Wildlife, specifically Dave Person, Deer Biologist Northern District and Great Swamp United States Fish and Wildlife Service, specifically Harold Laskowski, Assistant Refuge Manager.

Determinations of critical survey areas to include favorable deer bedding and yarding areas were made and transect lines were established for a preliminary verification run. Between January 25 and February 3, 1984, park ranger Jim Gorman conducted the first survey with the field assistance of Edison National Historic Site ranger Doug Jones, park volunteer Mary Skalka and park ranger Bill Erbe. The information gathered indicated that the majority of these transect lines were ideal for the study since substantial deer activity was evidenced in these areas.

Other Agency Involvement: The formation of a survey team began in February and March. It was expected that several members of the park staff would be involved, however, it was recognized that the effectiveness of the study would be directly enhanced by increased participation. Since several adjacent land-management agencies share this common resource concern, four other groups were notified and encouraged to participate.

These included the Great Swamp National Wildlife Refuge, the Morris County Park System, the New Jersey Audubon Society and New Jersey State Division Fish, Game and Wildlife. The response was very encouraging, all indicated that they were extremely interested in the results and would support the study as strongly as they could.

Survey Set-up: Using the best available park map, classic deer wintering areas were selected and transect lines were drawn to cover these sections. Input from several individuals familiar with the park assisted in prioritizing and reducing study lines to achievable levels. Dave Person from New Jersey State, Protection Supervisor Bill Deen and other members of the protection staff were able to offer valuable suggestions.

Once these lines were drawn on the park map, bearings were established for each. Some logistical factors had to be considered so that movements could be implemented with ease in the field. Valuable time could be lost if great distances from line to line existed. In addition, consideration was given to the selection of lines so they could be duplicated from year to year.

Besides the selection of known deer bedding sites, line selection should also attempt to present an overall representation of park habitat. A random systematic sample such as this, allows for random placement of lines throughout the entire park with increased line concentration in areas of high activity. Good line selection, considering all objectives, is one of the most critical aspects of pre-planning. In order to document the study area and measure the area surveyed, little alteration should occur in the field.

Field Techniques: Field implementation consists of locating the starting point for the first transect line and forming a line of participants perpendicular to this point with a spacing of approximately ten feet between individuals. There should be 100% visibility along the line so that any carcass on the ground between the two end individuals will be sighted. The human line moves forward at a pace commensurate with the terrain and the vegetation. Since this will vary along the line, it is important that the line move as a unit and only as fast as the slowest individual at any one point. The direction of the transect is determined by the previously established bearing and in the field is rechecked at regular intervals by at least one compass person.

When a deer carcass is sighted along the line, important information should be gathered.

1. The carcass is initially examined to determine cause of mortality (bullet holes, wounds, etc.) and time lapse since death occurred. It may not always be possible to determine this, but in other incidences, it will be very apparent.
2. The most important information for the purposes of this study will be the bone marrow analysis. The back femur (or thigh bone) is cut open using a hatchet, saw, axe or knife. The marrow is examined for color and condition. The bone marrow on a deer that starved to death is a red, gelatinous material.

This occurs because the deer is actually drawing on the fat reserves within the bone marrow to survive. The marrow of deer which died of other than starvation appears white, waxy, solid. Note: this may not hold true for a fawn since bone marrow will have a pinkish tinge even in a well-fed animal.

3. The age of the animal should be recorded and can be determined from examining the teeth and jaw bone.
4. The sex of the deer is noted if it can be determined.
5. In a male, antler beam measurement and the total number of points or tines is recorded.
6. The weight of the deer is also measured if it is a recent mortality, and the carcass condition is still fairly good. All this information along with location, date, time, temperature and weather is noted on the deer information report. Before leaving, the bones are marked with a brightly colored spray paint (yellow is recommended) so the same deer will not be examined in future studies.

Results: The date, April 4, was selected for two unrelated reasons. First, it was the end of the critical winter period (a heavy winter storm of one foot snowfall occurred on March 29), and second, that day afforded the highest level of possible park employee involvement. This date, unfortunately, provided heavy rains and cool temperatures. All participants were aware of the potential for poor conditions and came prepared.

Sixteen participants representing six different groups or associations joined the survey. From Morristown National Historical Park, four divisions including Protection, Management, Interpretation and Resource Management were represented in varying degrees. I had hoped for between 10 and 12 participants, so the turn-out was very gratifying. However, because of the areas of dense vegetation in the park and the resultant break-up of the line in these areas, much more than 16 participants could be ineffective.

Numerous sitings of both deer activity and deer occurred on nearly all transects. Typical deer signs included pellets, abundant browsing, bedding sites, yarding areas and hair. In a few areas numerous deer bones, usually quite old, were found in addition to clumps of hair. Two carcasses were located. The first located mortality was found on transect line four which ran along West Primrose Brook.

This mortality was a young deer (aged less than or equal to one year). It had been dead for one-two months. The carcass was badly mangled and there was a good possibility that it had been killed by dogs. The bone marrow analysis revealed that it had not starved to death. The skull could not be located so aging was not possible. No sex determination was possible from the limited remains.

A second carcass was located on the seventh transect line, a little more than half way between the starting point of Jockey Hollow Road and the soldier hut parking lot end point. This carcass was in between condition, only partially decomposed. It was an older deer aged at approximately three and one half. It was a male and had eight points and an antler beam measurement of 25.5. Bone marrow analysis revealed that this deer also had not starved to death.

Discussion: A significant portion of the park, especially the wintering habitat for deer, was covered in this survey. Estimates for this amount are included on an attached sheet. Based on this, it is apparent that excessive deer mortality did not occur in the park during the last season. Starvation-induced mortality were non-existent.

The winter 1983-84 was fairly mild. Although a few periods of heavy snowfall occurred and periodic cold snaps were experienced, the two were seldom simultaneous nor extended. A change in this factor could alter the above results. However, this baseline data indicates that the park and adjacent property habitat can support a sizable deer population in healthy condition. This data does not support a claim that the park population is starving, in fact, quite the opposite was revealed.

Recommendations: It is strongly recommended that this monitoring be continued. A duplication of this study on an annual basis would substantially add to the data base and permit valuable comparison. It is also hoped that the inter-agency cooperation achieved through this survey be continued. By sharing information on an area of mutual concern, all groups can benefit. A list of the participating agencies and individuals involved is attached.

Modifications: I recognized a few areas which could be improved in our future surveys. It's important that one person retain responsibility for implementing the survey based on the pre-selected study zones. The transect lines selected were excellent in terms of randomness (representative overall) and systematic success (significant deer activity was apparent on line) and should require little revision. Logistically they were also successful in terms of leading from one to another and returning participants to the appropriate point at the appropriate time. Although maintaining a certain degree of flexibility may be desirable, excessive modification will invalidate maps, area determinations and duplication efforts. It is recommended that one center person be responsible for establishing the compass bearing. This person would not also be searching for deer, therefore, he/she could concentrate on repeatedly verifying the line direction. Two assistants, also with fixed compass bearings should work a similar responsibility at each end. No one without a compass should attempt to provide line direction.

One major revision I recommend for successive repetitions; is that two additional separate individuals be responsible for keeping all participants on line. This would relieve the compass person from that responsibility and provide for more complete uniformity in pace. The tendency of the line to mesh together was a minor concern at one or two points. As this occurs, the area covered decreases markedly and extrapolation results could become greatly biased as a result. An occasional individual

would move far ahead of the line which was more disruptive than validity threatening. By assigning certain individuals the responsibility of maintaining the line as a single unit, the occurrence of this should greatly decrease.

Safety: This topic should be emphasized repeatedly. All participants should be made aware, in advance, that good sturdy hiking boots are necessary, warm protective clothing (including good rain gear!) is needed and gloves should be worn. Some rocky terrain exists, some uphill climbing is to be expected, a few wet areas will be encountered and an occasional vegetative threat such as thorns, poison ivy, brambles and vines. During wet cold weather like experienced in 1984, individuals should be observed and questioned on condition, warmth, etc. If possible, a patrol ranger should be available to help transport so participants will feel they do have the option of leaving fairly conveniently. Good radio communications will be important.

In Conclusion: I feel this study was very worthwhile. As time passes, this information will only increase in value. Besides the immediate benefits in terms of resource data and baseline information, there are indirect benefits too numerous to mention. Just to name a few, the cooperativeness with other land management agencies and within the park, the experience in compass work, the experience of field work off the trail, the practice for a search operation and the repeated recognition of deer activity were all beneficial to the park and staff.

11/83

DEER INFORMATION REPORT

MORRISTOWN NATIONAL HIST. PARK

(10-343 or 343A
should also be
completed)DATE 4/4/84REPORTER D. Buzzell-GrittSEX OF ANIMAL MALE X
FEMALE _____TIME 3:00 (pm) am _____WEATHER approx. Rain, coolANTLER MEASUREMENTS
MEASUREMENTS OF ANTLER BEAM
TWO DIRECTIONScloudy. Some
ground snow cover still.25 mm 26 mmAPPROX. AMBIENT TEMP. 45-50°

AVERAGE OF TWO MEASUREMENTS

25.5 mmWEIGHT could not meas. lbs.TOTAL NUMBER OF POINTS 8 4:4AGE OF DEER >2 1/2 - 3 1/2BONE MARROW X white, fatty red, gelatinousCONDITION OF CARCASSLOCATION OF DEER More than 1/2 way (center part)
on line from Jockey H. Rd to Soldiers hutpartially decomposed
(note any bullet holes or
other evidence of cause of
death, also note deteriora-
tion here or under comments)COMMENTS Second carcass found on

Deer Mortality Survey - older buck with good, healthy
rack. Cause of death was not starvation. Could not
observe any bullet wounds, bone damage etc. to
indicate Cause of death - uncertain. Some decomposition
made it difficult to ascertain. Racks still intact
not dropped - late drop this yr. Deer probably dead
since February. Transect line # 7 - see map 1.

11/83

DEER INFORMATION REPORT

MORRISTOWN NATIONAL HIST. PARK

(10-343 or 343A
should also be
completed)DATE 4/4/84SEX OF ANIMAL MALE could not
FEMALE be determinedREPORTER D. Buzzell-GrittTIME 11:20 pm amWEATHER rain, cool,
cloudyANTLER MEASUREMENTS
MEASUREMENTS OF ANTLER BEAM
TWO DIRECTIONSN mm N mm
A mm A mm

AVERAGE OF TWO MEASUREMENTS

N/A mmTOTAL NUMBER OF POINTS N/ABONE MARROW X white, fatty red, gelatinousLOCATION OF DEER North of W. Primrose Brookjust prior to trail intersection of PP w/ back trailCOMMENTS First carcass found on Deer Mortality Survey -

Appeared to have been possibly killed by dogs - very
mangled, scattered bones etc. Did not die of starvation.
Primary analysis by N.J. State deer biologist Dave Person -
15 survey participants observed. Photo documented also.
Transect line #4 - see map 1. Deer dead for over
1 month.

APPROX. AMBIENT TEMP. 45°WEIGHT could not determine lbs.AGE OF DEER <1 year - 1 yearCONDITION OF CARCASS very
mangled(note any bullet holes or
other evidence of cause of
death, also note deteriora-
tion here or under comments)

DEER SURVEY AREA DETERMINATIONS

1. 19,000 feet X 108 feet = 2,052,000 feet²
Total length of all transects X diameter of transect
2. Determination of diameter of transect
A.M. session 16 participants X 8 feet (approx. spacing) = 128
P.M. session 11 ave. participants X 8 feet (approx. spacing) = 88
Ave. = 108
3. Constants for computation
1 Acre = 43,560 feet²
1 Mile = 5,280 feet
1 Mile² = 27,878,400 feet
1 Mile² = 640 A
4. $\frac{2,052,000 \text{ feet}^2}{43,560 \text{ feet}^2} = 47 \text{ Acres}$
5. Park Area
1,627 Acres = 2.542 miles² = 2.5 miles²
6. .0289 = 3% park area surveyed

Extrapolation for entire park would equate 65 deer mortalities for unsurveyed area, none starvation induced. However, many variables make that figure too high. The surveyed areas were all zones of traditional yarding-up and would be areas of high mortality. In addition, some areas of the park are developed, such as maintenance areas, residences, visitor services and do not serve as deer habitat so mortalities can not be expected there.

PARTICIPANTS

<u>NAME</u>	<u>AGENCY/LOCATION</u>
1. Debbie Buzzell-Gritt	Morristown National Historical Park
2. Jim Gorman	" " " "
3. Doug Jones	Edison National Historic Site
4. John Dwyer	Morristown National Historical Park
5. Jim Holcomb	" " " "
6. Lynn Wightman	" " " "
7. Jay Mills	Volunteer - U.S. Fish and Wildlife Service - Great Swamp
8. Bill Deen	Morristown National Historical Park
9. Tom Jasikoff	U.S. Fish & Wildlife Service
10. Jerry Rodriguez	Great Swamp / U.S.F.W.S.
11. Chuck Bischoff	Volunteer
12. Moira Ingle	NJ Div. of Fish, Game and Wildlife
13. Dave Person	" " " " " " "
14. Mary Skalka	Morristown National Historical Park
15. Craig Witty	Morris County Park Police
16. Steven Terraciano	" " " "

SUPPLIES USED

Several pair plastic gloves (latex-type)
One pair calipers
Three-four compasses
One can spray paint (bright yellow)
One small axe, hatchet or collapsible saw with guard
Flagging and/or aluminum tags
Several small day packs
Several pair work gloves
Watch
Park maps (with plastic coverings)
Small field clipboard with supply of deer information forms
Pencils
Camera and film
Knife (buck)
Radios

Optional:

Jawbreakers
Hoist
Weigh scale (Hansen)